Lesson of the Week

Vertebral osteomyelitis in the elderly

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Osteomyelitis may be missed in elderly patients with backache when they already have degenerative spinal disease. We report four cases of non-tuberculous vertebral osteomyelitis seen in an acute geriatric unit over 10 years. All four cases were due to infection with Gram negative organisms. An awareness that osteomyelitis has a predominantly non-staphylococcal cause in elderly patients may help in reaching a correct diagnosis.

Case reports

The table summarises clinical details of the four patients.

Case 1—An 80 year old man was admitted with a one week history of anorexia, vomiting, pain in the right hypochondrium, and fever. His urine was sterile, but cultures of blood grew *Escherichia coli*. He improved after

Non-staphylococcal osteomyelitis should be considered when elderly patients complain of backache or worsening of established back pain

receiving fluids and ampicillin intravenously, but two days after treatment with the antibiotic was stopped he again developed septicaemia caused by *E coli*. Shortly afterwards he complained of thoracolumbar pain. An x ray film showed lumbar spondylosis. Two further courses of antibiotics were given for urinary tract infections caused by *E coli*. During his convalescence he was lethargic and had persistent thoracolumbar backache. Repeat spinal radiographs obtained during the fourth week of his illness showed

FIG 1—Case 3. Anteroposterior (a) and lateral (b) radiographs of lumbar spine showing early stages of osteomyelitis four weeks after onset of symptoms.

Clinical details of four patients with osteomyelitis

Case No	Time from onset of illness to diagnosis (weeks)	White cell count ($\times 10^9/l$) (range)*	Plasma viscosity (range)* (mPa.s)	Fever	Organism and site	Site of osteomyelitis	Outcome
1	4	17.4 (17.3-17.4)	1.8 (1.8-1.9)	Yes	<i>E coli</i> , blood and urine	L1	Death
2	8	12		Yes	<i>Klebsiella</i> , bone	L3 and 4	Paraplegia
3	14	4.9 (4.9-8.2)	1.73 (1.68-2.1)	No	<i>E coli</i> , urine and bone	L3 and 4	Recovery
4	3	5.0 (4.6-8.0)	1.8 (1.7-1.9)	Yes	<i>E coli</i> , urine	L4 and 5	Recovery

*At diagnosis—that is, after onset of backache and before treatment for osteomyelitis.

osteomyelitis of L1. He died of septicaemia caused by *E coli* despite further treatment with antibiotics.

Case 2—A 72 year old man with type II diabetes mellitus presented with a two month history of back pain and a one week history of immobility and confusion. He had been prescribed co-trimoxazole for what was presumed to be a urinary tract infection. On admission he was febrile and disorientated. He had signs of compression of the cauda equina, with flaccid paralysis, absent tendon reflexes in both legs, and retention of urine. There was localised tenderness over L3 and L4. Radiographs showed osteomyelitis at this site, which was confirmed by needle biopsy. He was treated with antibiotics. When discharged six months later he had an indwelling catheter and was confined to a wheelchair.

Case 3—A 78 year old man attended the outpatient clinic for low backache. The results of tests performed while he was under the care of his general practitioner had shown a high plasma viscosity, and a radiograph showed changes that were initially interpreted as spondylosis (fig 1). He had no other symptoms such as localised tenderness in his back or evidence of a urinary tract infection. A repeat x ray film 12 weeks after presentation showed that osteomyelitis had progressed at L3 and L4 (fig 2). Considerable numbers of *E coli* grew on culture of a urine sample, and infection caused by *E coli* was confirmed at biopsy. After a six week course of intravenous and then oral ampicillin his backache stopped and an x ray film showed that the infection had resolved.

Case 4—An 83 year old woman presented with worsening of her longstanding lumbar backache. She had refractory anaemia associated with marrow hypoplasia and had been taking prednisolone 20 mg daily for the past eight years. On admission she had widespread osteoporotic collapse of the spine at all levels and localised tenderness at L4 and L5. She was feverish, *E coli* grew on culture of a urine sample, and a bone biopsy specimen showed active inflammation. No organism was grown on culture of the bone biopsy specimen, but because of the active inflammation vertebral osteomyelitis was diagnosed. She responded to a six week course of antibiotics.

Discussion

Although pyogenic vertebral osteomyelitis is now more common than tuberculous vertebral osteomyelitis in white people, it is an uncommon condition with an incidence of one in 250 000 a year in the United Kingdom.¹ There are no studies of large series of adults correlating the type of infecting organism with the age of the patient. Out of a total of 59 patients reported on in three studies, 17 were aged over 65, of whom 11 had a vertebral infection with

FIG 2—Case 3. Anteroposterior (a) and lateral (b) radiographs of lumbar spine showing progression of osteomyelitis in L3 and L4 16 weeks after onset of symptoms.

Gram negative bacteria (seven *E coli*, three *Proteus*, and one *Pseudomonas*).¹⁻³

Several workers have shown a bimodal pattern in the age distribution of non-tuberculous spinal infections, the first peak occurring in the second decade and the second in the sixth or seventh decade.⁴ Most cases in young patients are due to staphylococci. Most clinicians consider Gram negative organisms to be a rare cause of spinal infections, but as long ago as 1956 Henson and Coventry drew attention to the importance of the urinary tract in the pathogenesis of vertebral osteomyelitis.^{5,6} Infection with Gram negative organisms is common in the elderly, and if it is asymptomatic it will probably not be treated. Most proved bacteraemias in elderly patients are also caused by Gram negative bacteria, so the preponderance of these organisms in spinal infections might be predicted.

One of our patients (case 1) was initially thought to have simple degenerative disease and was treated with analgesics, which relieved his back pain. The patient in case 2 was referred for terminal care with a diagnosis of vertebral collapse secondary to carcinoma. A lack of awareness of osteomyelitis due to Gram negative bacteria delayed the diagnosis in both cases, contributed to the death of the patient in case 1, and meant that surgery was not used in the other patient (case 2). In retrospect, the patient in case 3 had a vertebral infection that was evident in an x ray film three months before he presented to hospital, where the true diagnosis became obvious. The fourth patient was referred to us subsequently, and her diagnosis was prompt.

If vertebral osteomyelitis is suspected bone biopsy will be indicated if not mandatory. The choice of antibiotic depends on the results of culture, but up to 80% of needle biopsy specimens may provide insufficient tissue for full microbiological analysis. Thus only the organisms that are considered to be the most probable cause of the infection should be treated. The duration of treatment with antibiotics is influenced by the clinical response, changes in biological markers of inflammation such as the erythrocyte sedimentation rate, and changes in radiographs, but it should not be less than six weeks. The value of prolonged bed rest is unproved,³ as is rigid immobilisation in a plaster cast: both should be avoided in elderly patients.

Paraplegia occurs in up to 10% of patients with osteomyelitis. Recovery usually results after treatment with antibiotics alone,⁷ but several workers have suggested a more radical surgical approach.⁸⁻¹¹ Ideally surgery should be done early in the course of the illness, but surgical decompression may still benefit weakness of the legs of many weeks' duration.^{8,10} Surgical intervention should always be

considered,^{8,9} especially for patients with large abscesses or those who fail to respond to antibiotics, and might have benefited two of our patients (cases 1 and 2).

In adults pyogenic vertebral infection tends to be insidious: clinical and biochemical markers of infection are often absent and characteristic changes in radiographs are seen only during the later stages. Osteoporotic crush fractures and spondylosis causing backache are common in elderly people and probably further delay diagnosis of osteomyelitis. Early diagnosis depends on awareness. Vertebral osteomyelitis must be considered when backache occurs for the first time or long established symptoms worsen; recent septicaemia caused by Gram negative bacteria or an obvious focus of infection increases the probability of osteomyelitis.

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MATERIA NON MEDICA

Benefits of civilisation

It has been suggested that Britain should become the fifty first state of the USA. The Marshall Islands would be one of several contenders for this title. Lying 2000 kilometres to the south west of Hawaii the Marshalls consist of some 1000 islands, reefs, and atolls strewn over 1 000 000 square kilometres of Pacific Ocean and are home to 31 000 inhabitants of whom 60% live on the atolls of Majuro and Ebeye. Having been a German protectorate, a Japanese military garrison, and, after a savage second world war battle, an American trust territory, the Marshall Islands today are best known for their contribution to the English language: the name of one of the small outer islands, Bikini. The islands of Enewetak and Rongelap were also used in the testing of nuclear weapons but have no eponymous swimwear.

The atoll island of Majuro is 60 kilometres long but only half a kilometre at its widest and, like all atolls, is flat with natural vegetation confined to some low shrubs and the ubiquitous coconut palm. The shoreline is littered with crushed beer cans and broken bottles. Large cars prowl along the tarmacaded road which stretches the full length of the island; road accidents are a common cause of death. There is little public transport and nobody walks; it is commonplace to see children picked up by the school bus only to be deposited outside their homes half a kilometre away. Many children are fat. There is a busy port, running water, and sanitation, but

most of the Majuroese exist on a combination of USDA handouts and artificially created government jobs, the real work being provided by American contractors.

While waiting at Tarawa Airport for the flight to Mujuro we met an old Texan. He had been a survivor of the slaughter at Betio, where in the second world war America had bloodily defended its western borders. Having returned for one final glimpse of the battleground, he had slipped and cut his arm which had become infected with great rapidity by the heavily polluted lagoon water. We had no medications with us, and, having applied a crude dressing, I suggested that he seek a tetanus jab and a course of antibiotics as soon as we reached our destination. We met him later that day in Majuro. A three minute consultation with an American doctor and a week's supply of tetracycline had cost US\$65.

Unless you are United States military personnel you cannot leave the plane at Kwajalein. This huge atoll encloses a lagoon of nearly 3000 square kilometres and is the testing area for intercontinental missiles and other Star Wars technology. From the plane you can see radar installations, swimming pools, and golf courses complete with golf buggies; the lawns are neatly clipped. The servants' quarters are on Ebeye Island five kilometres away. There live 10 000 Marshallese crammed into the island's 26 hectares. There are no golf courses or swimming pools.

In Britain 15 million trees were blown down in the recent hurricane. On Ebeye 80% of all homes were damaged by typhoon Roy and 3000 people are now homeless. Damage reports from Kwajalein have not been publicised. —PAUL HEATON, paediatrician, Invercargill, New Zealand.